10

Power
Source 200

Control
Circuitry 100

Load 300

Time Delay
Circuitry 500

Sensor
Circuitry 400

FIG. 1

CONTROL RELAY ~102

TIME
DELAY
CIRCUITRY
POWER
SUPPLY ~608

112 108

110 110

POWER
SOURCE ~200

CIRCUIT
BREAKER

104

106

B

LOAD ~300

402
SENSOR DIODE

516

518

TIME
DELAY
TIMING
CIRCUIT

504

502

666

TIME
DELAY
RELAY

512

514

TO FAULT
PROTECTION
CONDITION
INDICATOR

510
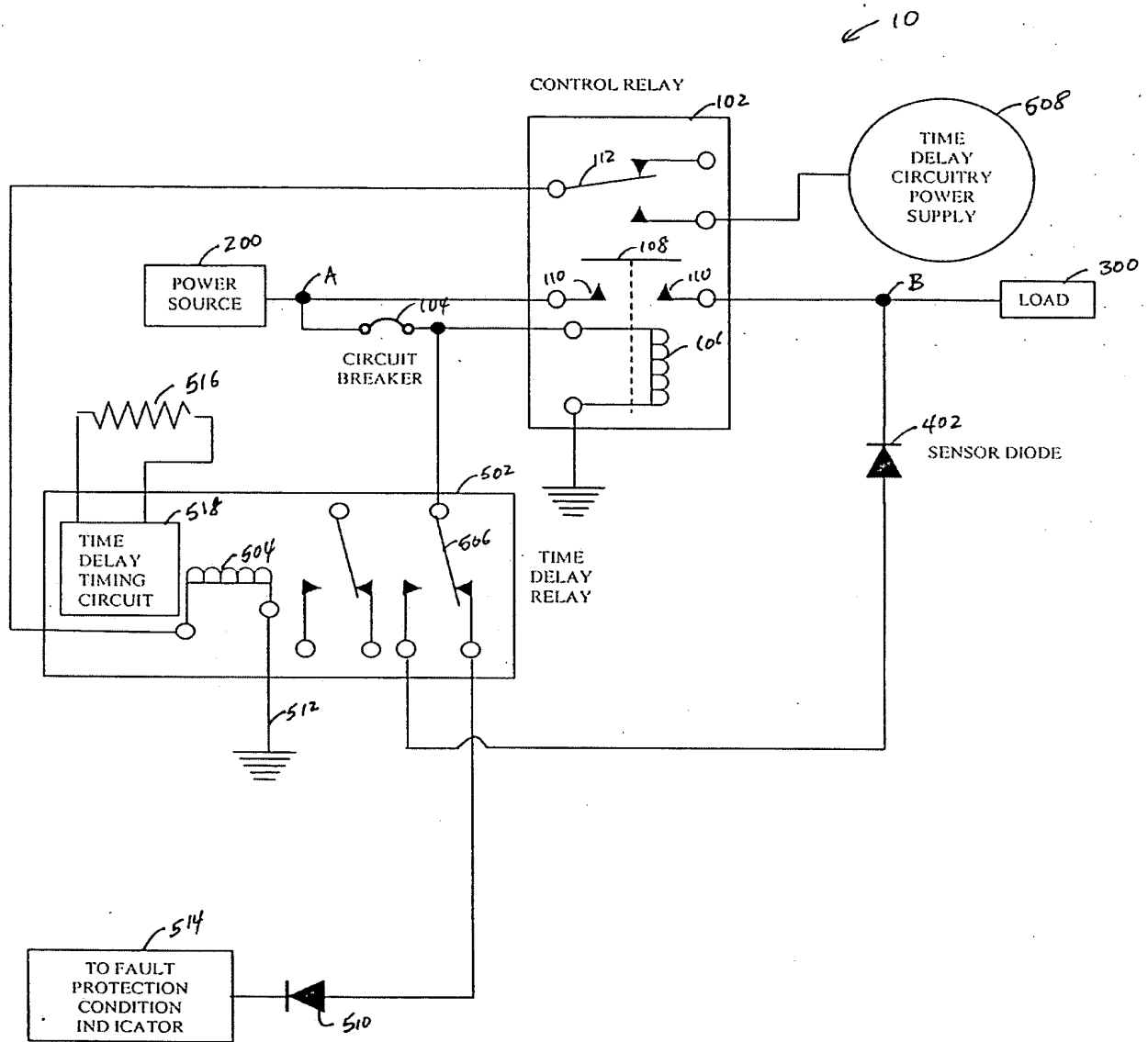
FIG. 2

CURRENT VS TIME-TIME DELAY RELAY

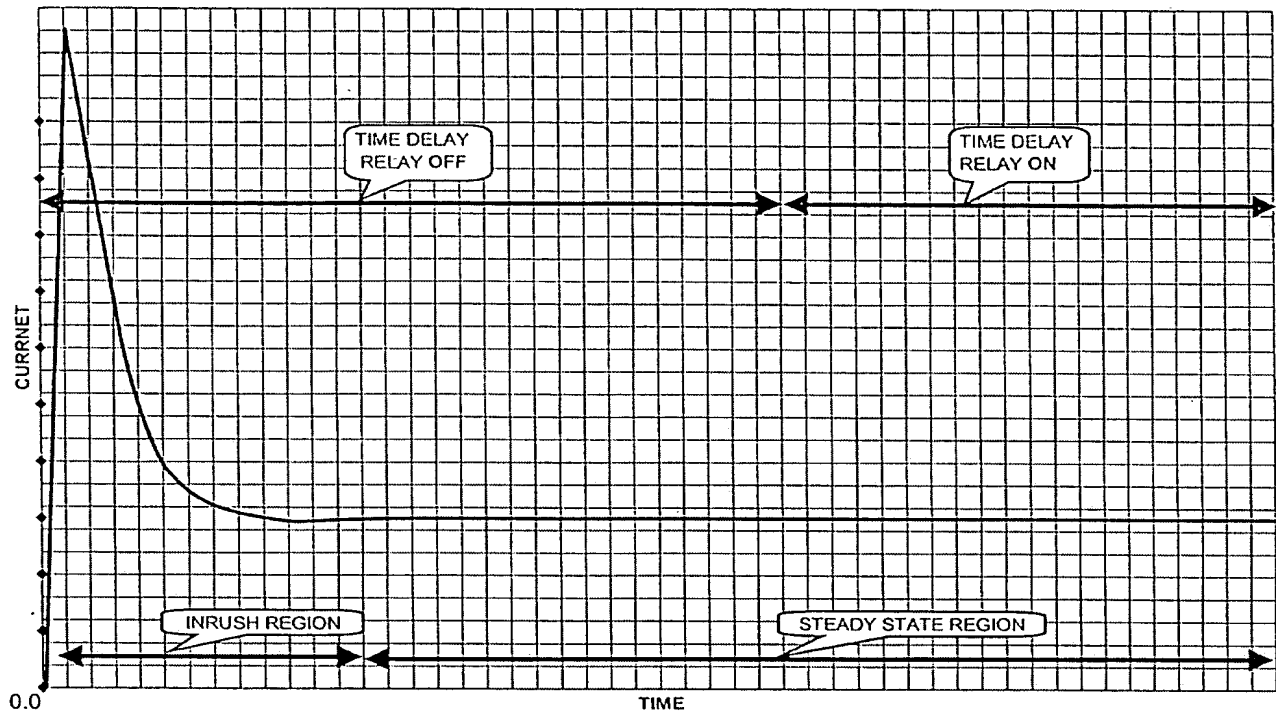
FIG. 3
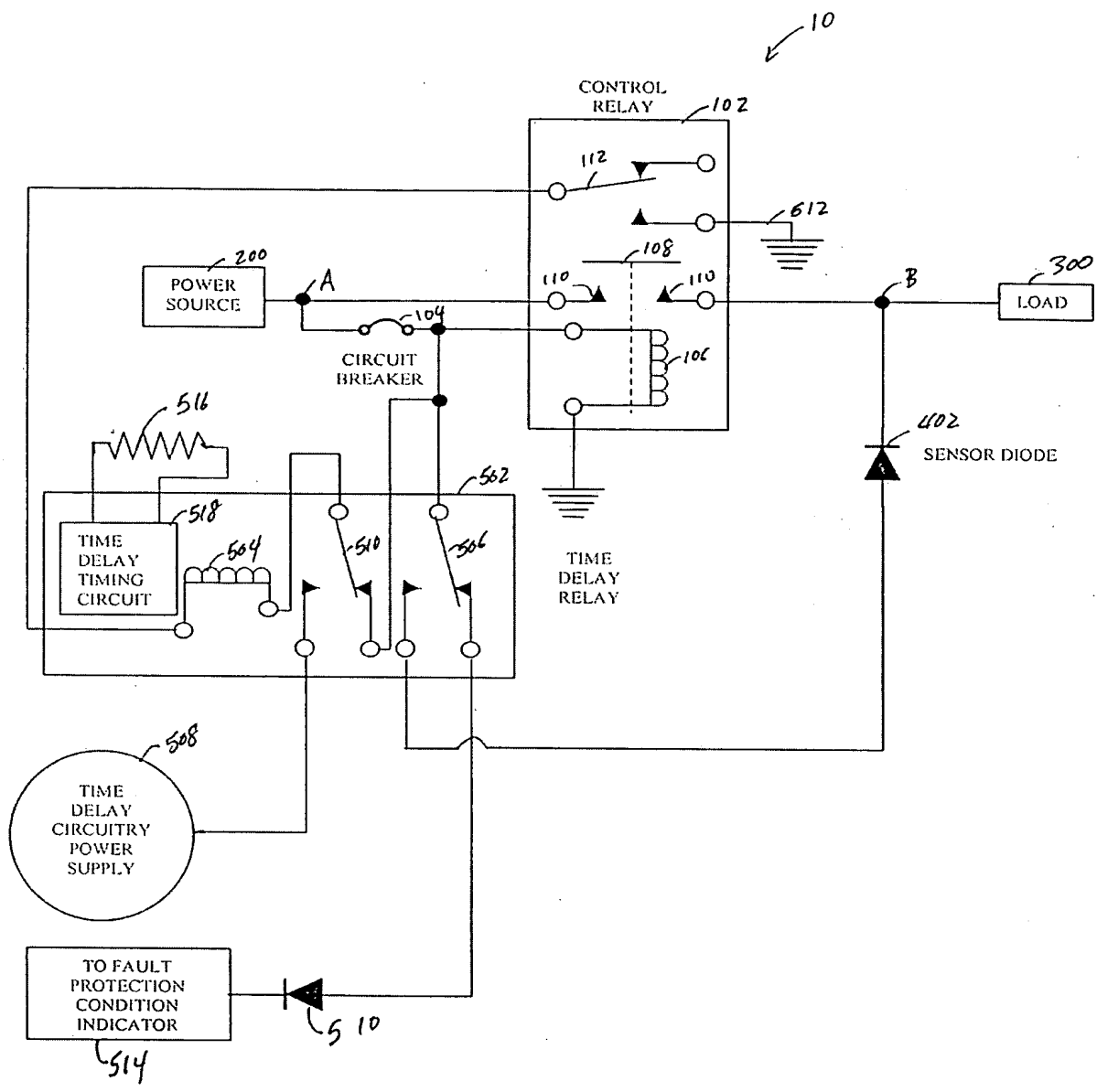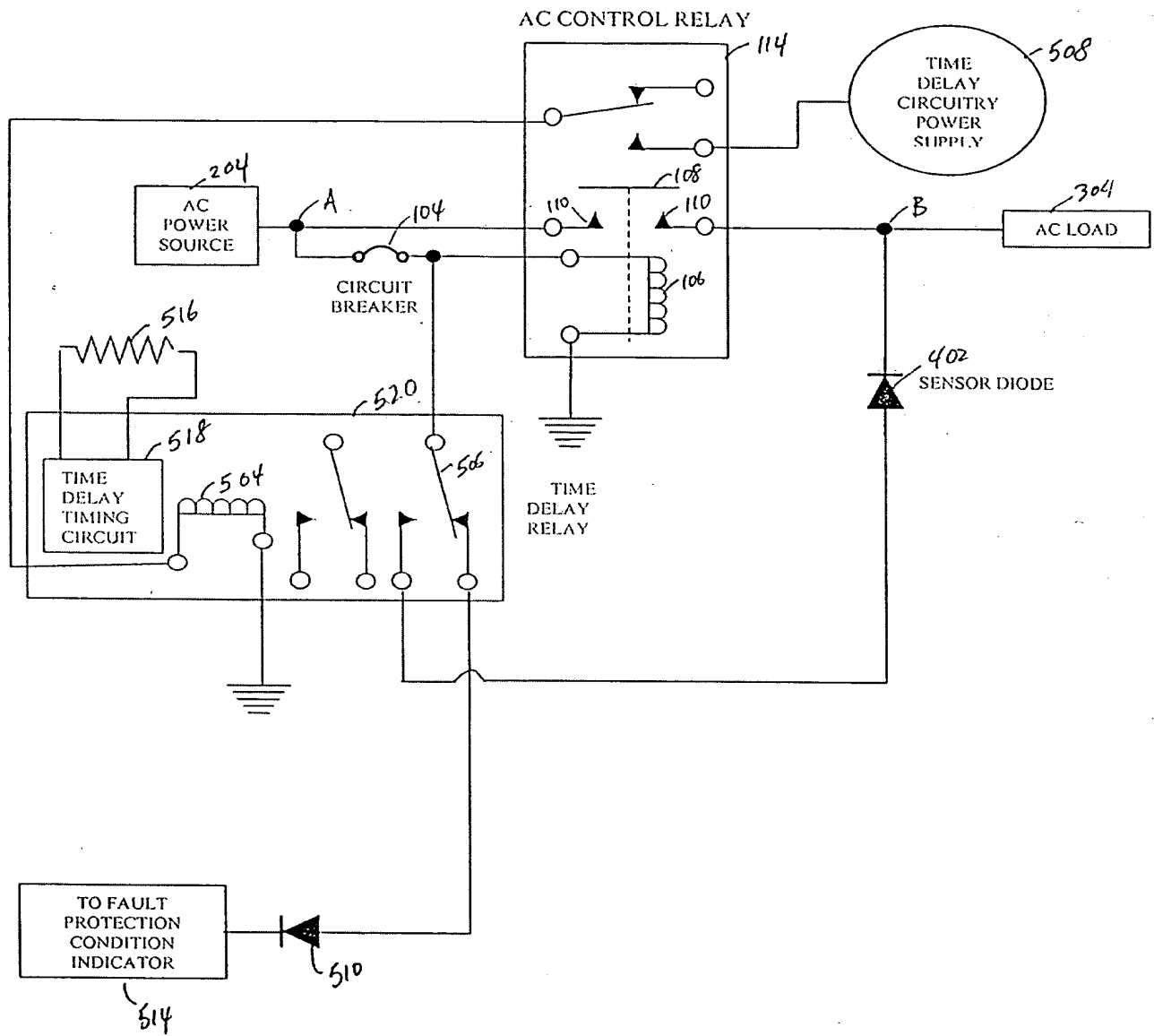
CONTROL
RELAY 102

112

612

200
POWER
SOURCE

A

104

CIRCUIT
BREAKER

108

110   110

B   300
LOAD

110

106

402
SENSOR DIODE

516

518

502

TIME
DELAY
TIMING
CIRCUIT

504

510

506

TIME
DELAY
RELAY

508

TIME
DELAY
CIRCUITRY
POWER
SUPPLY

514

TO FAULT
PROTECTION
CONDITION
INDICATOR

510

FIG. 4

AC CONTROL RELAY

TIME
DELAY
CIRCUITRY
POWER
SUPPLY ~508

114

204
AC
POWER
SOURCE

A

104

108

110   110

B   304
AC LOAD

CIRCUIT
BREAKER

106

516

520

518

506

402
SENSOR DIODE

TIME
DELAY
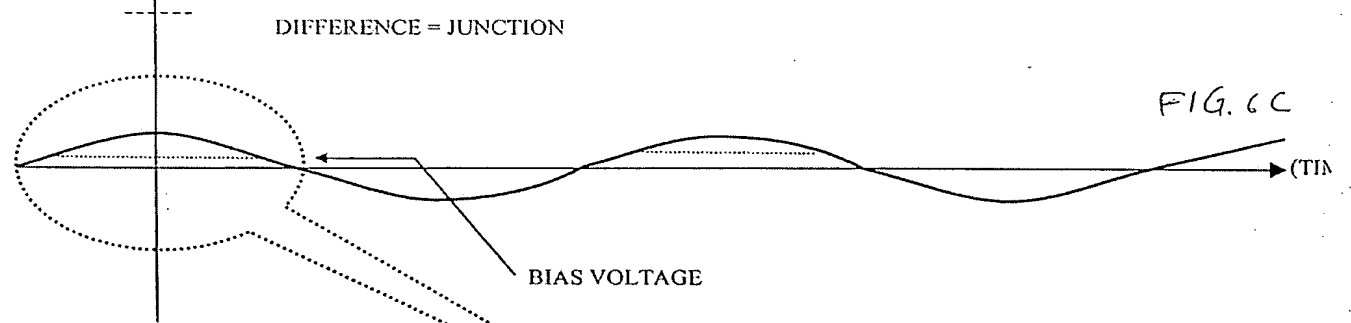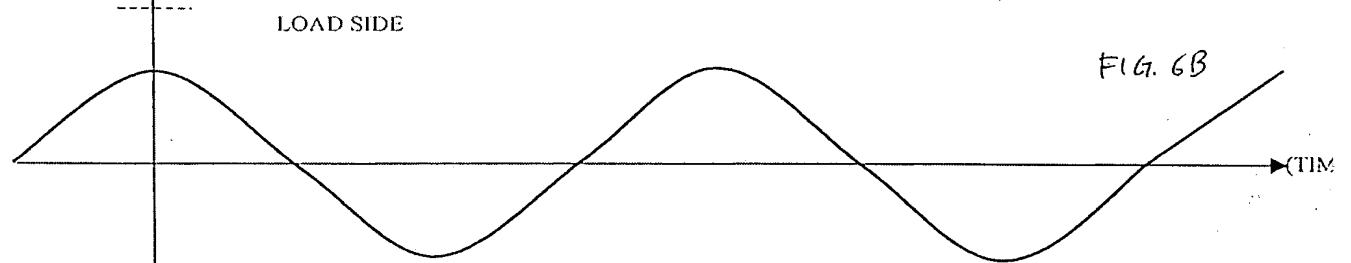TIMING
CIRCUIT

504

TIME
DELAY
RELAY

TO FAULT
PROTECTION
CONDITION
INDICATOR

510

514

FIG. 5

AC WAVEFORMS

FIG. 6A

(VOLTAGE)

GENERATOR SIDE

(TIM)

LOAD SIDE

FIG. 6B

(TIM)

DIFFERENCE = JUNCTION

FIG. 6C

(TIM)

BIAS VOLTAGE

DIODE BIASED ON

FIG. 6D

DIODE BIASED OFF

Diode in Conducting State
(Fault Detected) for this
Period Each Cycle

FIG. 7

CONTROL RELAY 102

TIME DELAY CIRCUITRY POWER SUPPLY 508

112

POWER SOURCE 200

A

CIRCUIT BREAKER 104

110 108 110

B

LOAD 300

106

516

518

TIME DELAY TIMING CIRCUIT

504

502

506

TIME DELAY RELAY

602

OPTOCOUPLER

606

COUNTER/BUFFER

702

704

Reset Timer
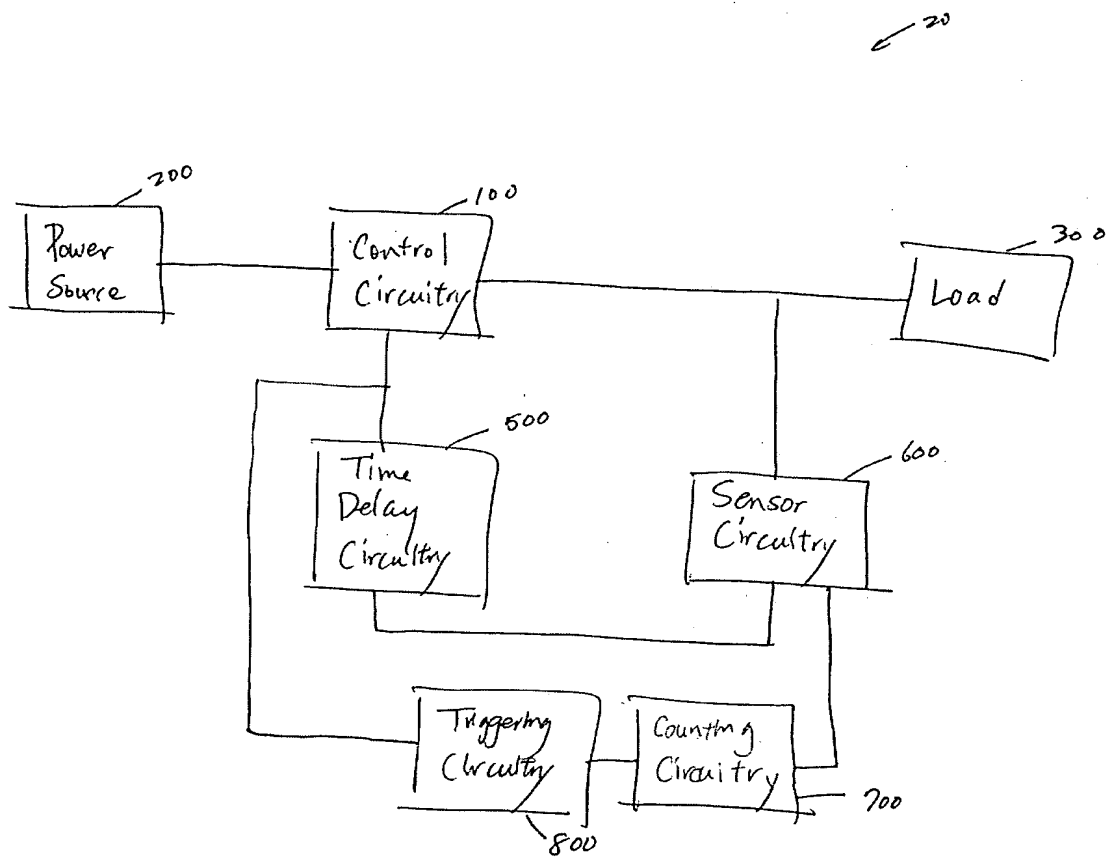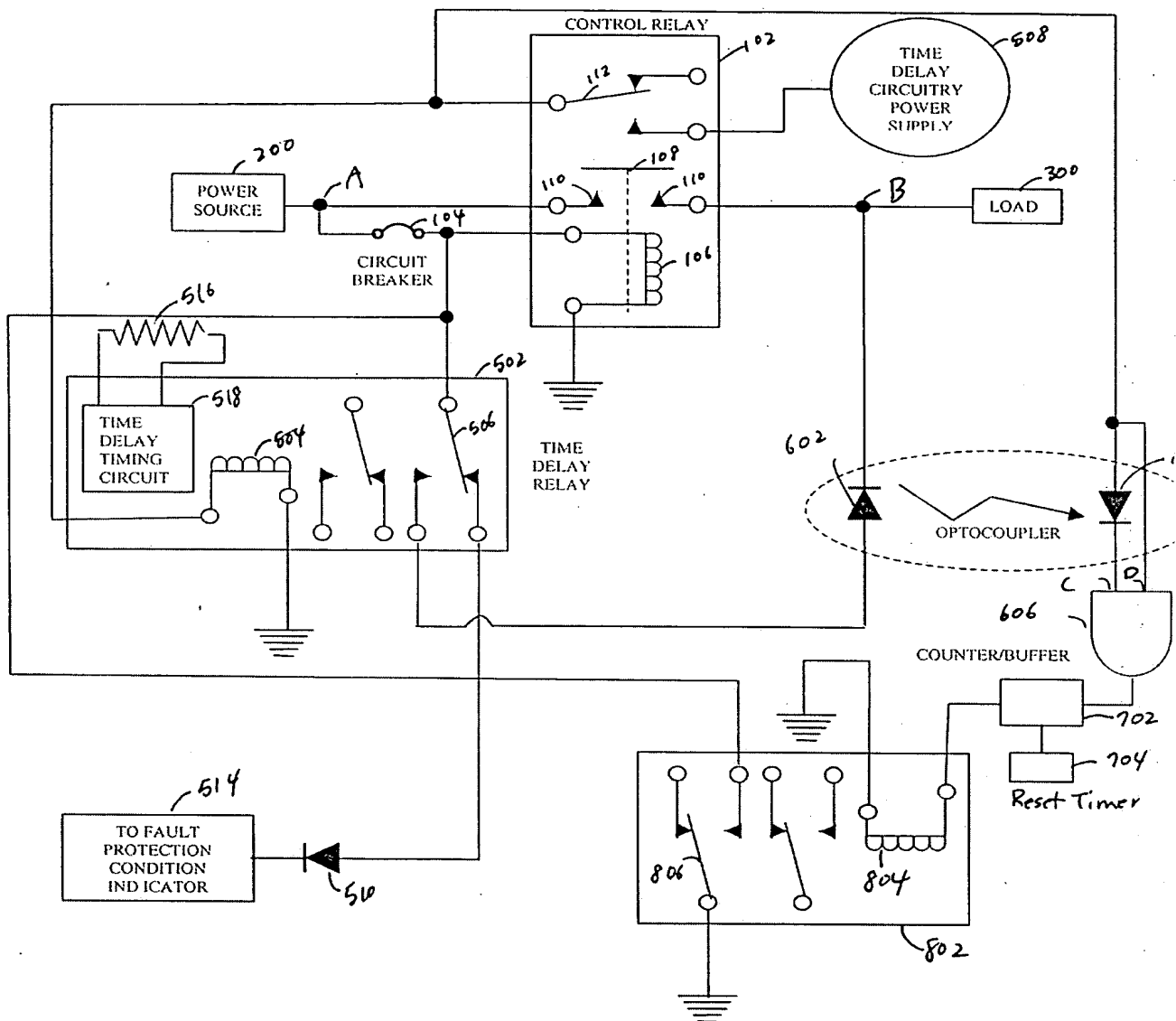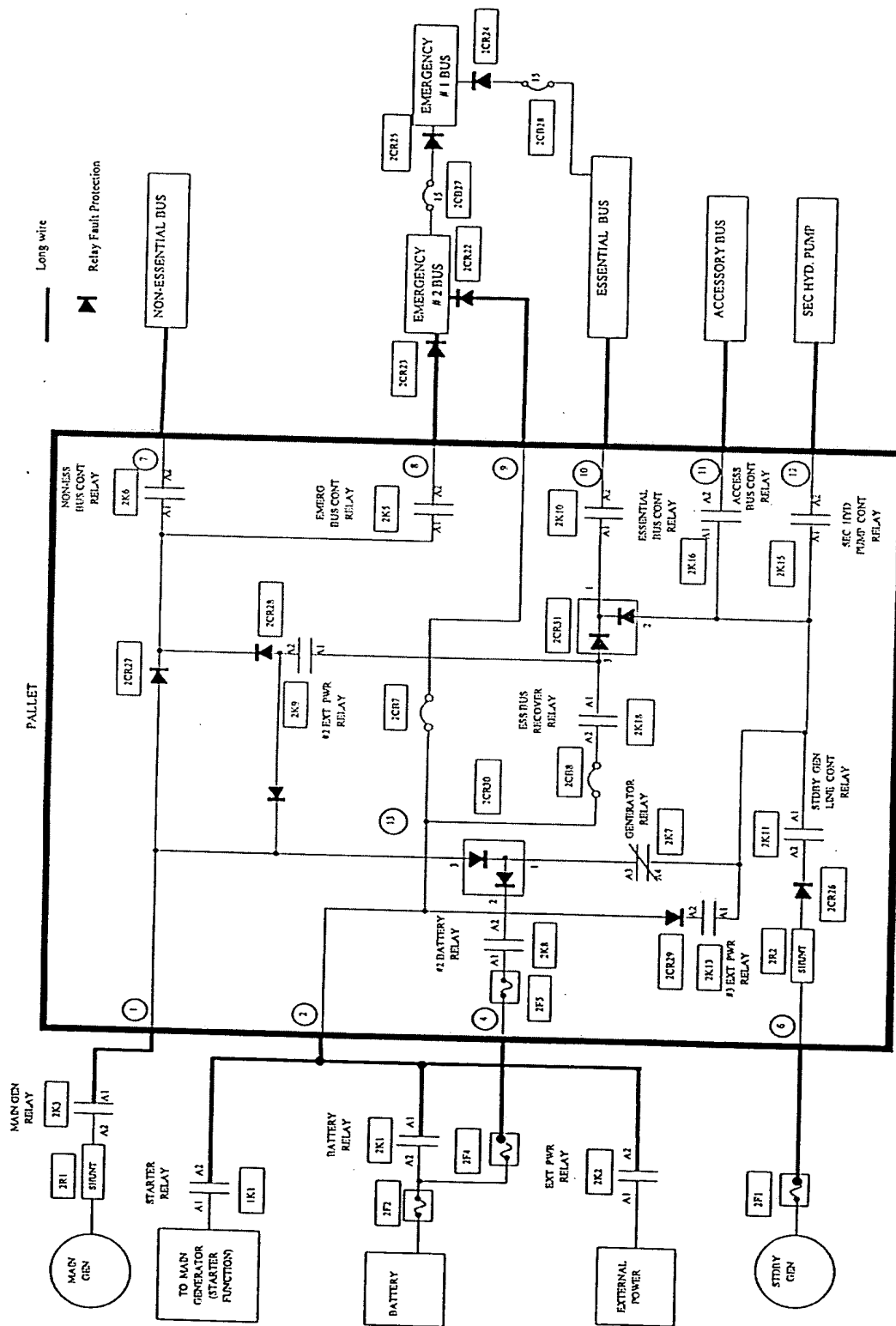
514

TO FAULT PROTECTION CONDITION INDICATOR

510

806

804

802

FIG. 8

407 1FR SIMPLIFIED ELECTRICAL SCHEMATIC (3 STRING)

FIG. 9

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